Report of the NRCB/CEAA Joint Review Panel
Application #9801 – Alberta Infrastructure
February 2002

Highwood Storage and Diversion Plan
Review of Progress Toward
Meeting Board Order 9601-1

NRCB
Natural Resources
Conservation Board

Canadian Environmental Assessment Agency
Agence canadienne d'évaluation environnementale

Alberta
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HIGHWOOD STORAGE AND DIVERSION PLAN
REVIEW OF PROGRESS TOWARD MEETING BOARD ORDER 9601-1

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1 Introduction and Background

In 1998, a previous NRCB/CEAA Joint Review Panel completed its review of the Little Bow Project/Highwood Diversion Plan proposed by Alberta Public Works, Supply and Services (now Alberta Transportation). This review resulted in provincial approvals for three of five components of the application: the Little Bow River Reservoir; the Highwood River diversion works and canal to the Little Bow River; and the diversion of water from Mosquito Creek to fill Clear Lake. However, the Panel deferred a decision on the two other components of the application - the Highwood Diversion Plan during low flow periods and the potential expansion of offstream storage at Women's Coulee - pending the receipt of additional information, including:

- a reassessment of the instream flow needs (IFN) for the Highwood River;
- additional information on the feasibility of flow augmentation in the Highwood River through offstream storage. This was to include a more detailed assessment of the Women's Coulee site, as well as a comparative analysis of this site and alternative storage sites including Tongue Creek and Stimson Creek (see Figure 1), among others; and,
- a revised diversion plan to address instream and consumptive needs during low flow periods.

As part of its approval, the Board issued Board Order 9601-1, which required Alberta Transportation to report back to the Panel with this additional information within 12 months (June 1999). A copy of Board Order 9601-1 is appended to this report.

In March 2000, the current Joint Review Panel (the Panel) was established under the *Natural Resources Conservation Board Act (NRCBA)* and the *Canadian Environmental Assessment Act (CEAA)*. The role of the Panel was to monitor Alberta Transportation's progress in addressing the outstanding information requirements and to ultimately conduct a public review of future applications for developing offstream storage and for implementing a revised diversion plan. Since being established, the Panel has held four public meetings to assess progress in meeting Board Order 9601-1.

The first of these public meetings was held on April 19, 2000 to consider a request by Alberta Transportation to extend the 12-month deadline for fulfilling the requirements of the Board Order. It also considered a variety of other issues raised by participants, including a proposal that the examination of storage sites be conducted within the context of Phase 1 of a Highwood Management Plan (HMP) being proposed by Alberta Environment. In its subsequent report (June 2000), the Panel agreed to extend the deadline for fulfilling the requirements of the Board Order to March 2002. The Panel also accepted the proposal to assess storage as part of the HMP, provided this was done in a timely way, and agreed that Alberta Transportation's role in the planning process would be to provide technical reviews and information on storage options. In addition, the Panel confirmed that Alberta Transportation would be responsible for submitting an application for offstream storage to the Panel, if the results of the HMP confirmed that storage was required, and for submitting a revised diversion plan.

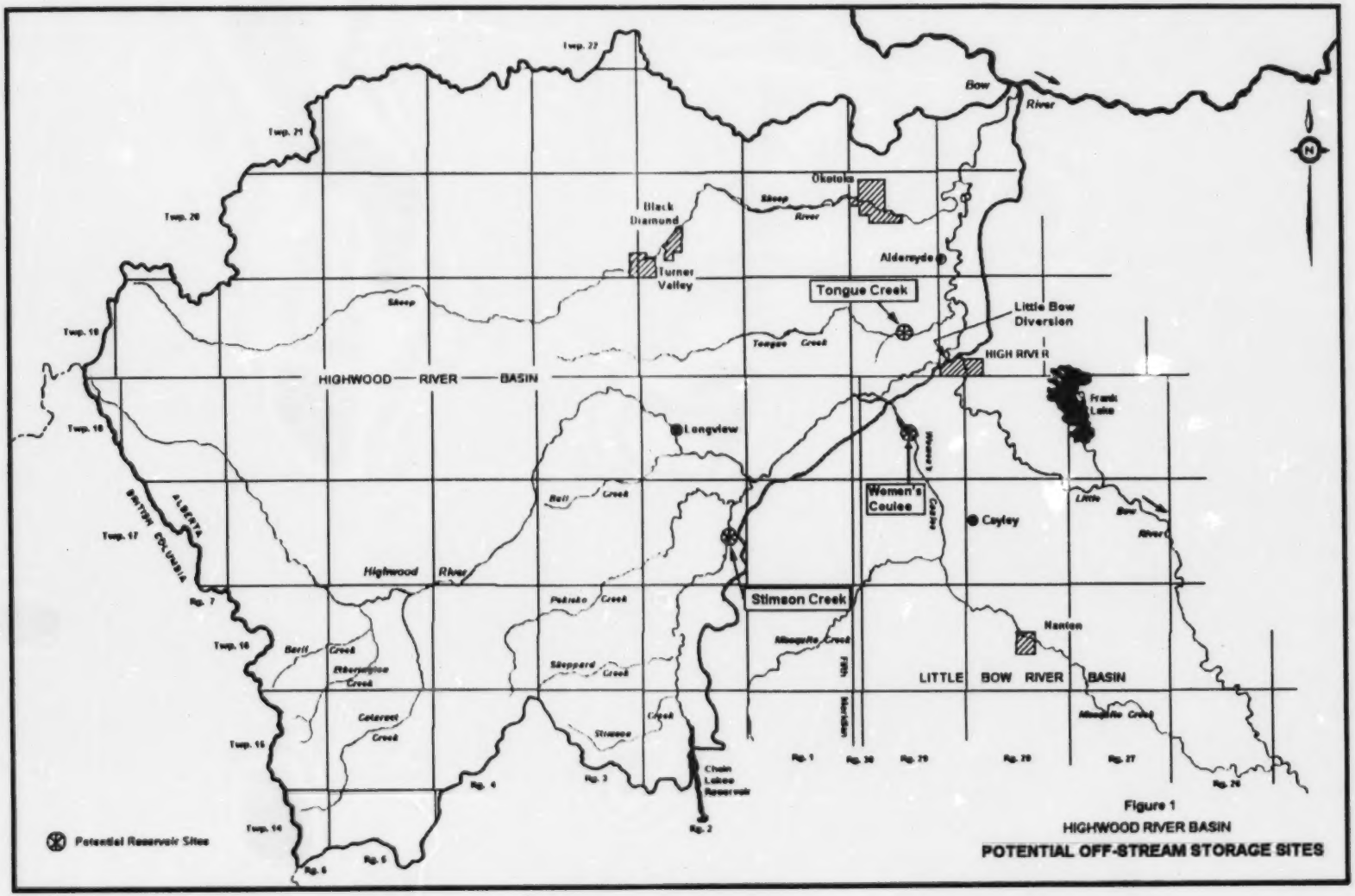

Figure 1
HIGHWOOD RIVER BASIN
POTENTIAL OFF-STREAM STORAGE SITES

The Panel held its second public meeting in High River on November 22, 2000. Alberta Environment and Alberta Transportation described their progress in developing a coordinated schedule for completing Phase 1 of the HMP, including an assessment of non-storage options and an assessment of the three proposed storage sites, under the direction of a Public Advisory Committee (PAC). While the Panel generally supported this approach, it asked the two departments to publicly file monthly progress updates in order to ensure that the work program would be completed by March 2002. The Panel also suggested that Alberta Transportation undertake a "fatal flaw" analysis to determine whether one or more of the three storage sites could be eliminated from further analysis on technical grounds, so that detailed investigations of a preferred site could be completed by March 2002.

The third public meeting was held in High River on June 2, 2001 to address progress on the HMP and on meeting Board Order 9601-1, and to review Alberta Transportation's "fatal flaw" analysis of the three sites. Although the Panel heard assurances from Alberta Transportation and Alberta Environment that the March 2002 deadline was still achievable, other parties reported that the PAC was making little progress and that there was confusion about the roles of the Panel, the government departments, and the PAC with respect to the HMP. Some parties also asked whether it was appropriate to be making decisions about storage sites when the need for storage had not yet been confirmed. In its June 2001 report, the Panel encouraged the PAC to continue its assessment of non-storage options and it directed Alberta Transportation to complete its assessment of the three alternative storage sites within 60 days. The Panel also stated that it would conduct another public meeting in the Fall of 2001 to review that report and subsequently make a decision on the most appropriate site or sites for foreseeable development of storage in the Highwood basin.

The Panel held its fourth public meeting in Okotoks on December 1, 2001. The key objectives of that meeting were to review Alberta Transportation's comparative site assessment and to determine whether March 2002 still represented a reasonable deadline for completing the HMP and for fulfilling the requirements of the Board Order. This report provides a summary of the results of that meeting.

2 Views of the Parties

Numerous parties made oral and or written presentations to the Panel. Their respective views are described and summarized below.

2.1 Public Advisory Committee for the Highwood Management Plan

Mrs. Shirley Pickering, Chairman of the Public Advisory Committee (PAC), reported on PAC's progress since the June 2001 meeting. She reported that the PAC had made great strides in the last several months, following an August workshop where PAC members agreed to make a committed effort to work together in addressing water management issues in the basin. Since then, the PAC has been meeting every two weeks and has developed a decision-making process, established an overall Management Committee, and has developed a work plan in consultation with Alberta Environment and Alberta Transportation.

Despite this progress, the PAC indicated that it had significant reservations about trying to complete Phase 1 of the HMP by the March 2002 deadline. The PAC reported that, in

attempting to meet the deadline, it had established subcommittees to review large amounts of information and report back to the remainder of the PAC on some key issues, such as the choice of storage sites and the review of non-storage options. While this approach made the process more time efficient, the PAC reported two significant drawbacks. First, subcommittee members still didn't have enough time to fully understand and critically assess all the existing information, let alone carry out any additional investigations to address information deficiencies. Second, only those PAC members on the subcommittee would have sufficient knowledge to make informed decisions on selected issues and this was considered contrary to the objective of having a fully informed PAC make confident, technically-sound decisions on all aspects of the HMP.

The PAC also noted that, under the current work plan, all of its technical review would have to be completed by the end of January in order to allow time for modeling of water management scenarios, selection of a preferred diversion plan, vetting this plan with the broader community, and providing a final recommendation by the end of March 2002. The PAC concluded that this work plan was unsustainable and that working to meet this plan would result in a premature decision that would not be widely supported within the basin.

In light of these problems, the PAC proposed extending completion of Phase 1 of the HMP to October 31, 2002. It submitted a revised work plan that was predicated on having the assessment of non-storage options completed by the end of March 2002, the water management scenarios identified by June, and the modeling completed during the summer months. The PAC suggested that this would still be an ambitious schedule, requiring its volunteer members to continue to meet every two weeks until the summer, but argued that this additional time was required if it was to obtain and understand all the evidence necessary to make sound water management decisions, especially in regard to the need for additional water storage in the basin.

The PAC recognized that extending the deadline would delay implementation of measures to improve instream flows in the Highwood River and would also mean that a revised diversion plan would not be in place prior to filling of the new Little Bow River Reservoir in 2003. However, it noted that Alberta Transportation had already suggested that an interim diversion plan would be required in any event since construction of additional storage, if required, would not occur until after 2003. PAC indicated that it was willing to consider such an interim diversion plan as long as it did not increase water deficits, it met or improved on current environmental flow needs, and it received approval from the PAC and the Panel.

2.2 Alberta Environment

Alberta Environment also reported that substantial progress on completing Phase 1 of the HMP had been made since June. The department credited the PAC with having developed and implemented an effective work plan and decision-making process. It stated that the evaluation of non-storage options was proceeding very well and that it would continue to find ways to support the PAC's efforts in arriving at a water management plan for the basin. Alberta Environment also reported that it was collaborating with the PAC in revising the budget to meet current needs and noted that some additional funds are now available for this process.

In terms of completing Phase 1 of the HMP by the March 2002 deadline, Alberta Environment reported that it continued to be optimistic. It noted, however, that meeting the deadline would

depend on the PAC's ability to review and assess a considerable amount of information, and it conceded that a significant amount of technical work, especially in regard to performance measures for irrigation and instream flow needs, was yet to be completed. The department indicated that, since the PAC was making good progress in completing its work, it would be desirable to extend the deadline. It suggested that the Panel's decision on extending the deadline be deferred until late February 2002, at which time Alberta Environment would provide the Panel with a situational analysis. If the analysis showed that the diversion plan could not be completed by the end of March and that there was public consensus on an extension, Alberta Environment would then recommend to the Panel that the deadline be extended. Otherwise, the department would continue to work with the PAC to finalize the diversion plan by the end of March, although the resulting solution might not receive widespread public support. Alberta Environment also noted that, if the deadline was extended, it would then provide funding for PAC operations in the 2002/03 fiscal year.

Alberta Environment also provided the Panel with an update on its efforts to develop a water quality management plan for the Mosquito Creek/Little Bow River watershed. It noted that it was developing a process to work with stakeholders to manage nutrients to ensure that the Little Bow River Reservoir would be mesotrophic and to control concentrations of E. coli. The department reported that it had been working with local municipalities and industries to reduce nutrients and E. coli levels in the basin to acceptable levels, especially in regard to Frank Lake. However, it acknowledged that there are no regulatory controls over some of the activities that affect water quality and it was specifically investigating ways of working with land users to reduce nutrient loads in the watershed.

The department noted that this was its first attempt to develop a water quality protection plan and described four major obstacles in implementing the plan, namely:

- lack of funding for actions to improve water quality;
- lack of sufficient and timely data on water quality;
- limited coordination between land uses, land use decisions and regulatory approvals; and
- inadequate linkages between data collection and corrective actions.

The department also noted that it would attempt to develop the water quality plan in association with other planning initiatives so as to minimize confusion and to develop consistent water quality objectives.

2.3 Alberta Transportation

Alberta Transportation reported on its progress in meeting the requirements of Board Order 9601-1. The department suggested that, by having submitted its Comparative Site Assessment, it had fulfilled Items 3 and 5 of the Board Order, and it sought the Panel's confirmation that these tasks were now complete. It also suggested that Items 7 and 8 were being addressed as part of Phase 1 of the HMP and that, in support of this process, it was providing technical support to the PAC. In terms of Item 6, Alberta Transportation reported that it had provided a draft copy of the assessment of instream flow needs (IFN) to the PAC and was awaiting further input before finalizing this work. Alberta Transportation also noted that it was impressed with the progress that had been made by the PAC since June 2001 and had concluded that it could fulfill its obligations in meeting the March 2002 deadline.

The department reported that, in accordance with the requirements set out in the Panel's June 2001 progress report, it had submitted the Comparative Site Assessment on September 18, 2001. Alberta Transportation tabled this report at the meeting and provided some additional analysis on water quality effects and the relative costs of recently completed water storage projects in Alberta. Alberta Transportation noted that, although its consultants had not been able to gain access to some areas for some environmental and technical studies, it still believed that the evaluation was sufficient to identify the best storage site if storage is required. Furthermore, the department concluded that, even had additional environmental and technical studies been undertaken, the relative rankings of the three sites would not change.

According to Alberta Transportation, the results of the Comparative Site Assessment showed that, if storage is required, Women's Coulee was the best of the three sites because it would have the least effects on the environment and would also be the most cost effective. In support of this conclusion, it provided an evaluation of the three sites using criteria suggested in the Panel's 1998 Decision Report:

	Panel's Suggested Criteria	Alberta Transportation's Assessment
1	Highwood River on-stream storage is not acceptable due to conflicts with fisheries requirements.	None of the three alternatives was located on the main stem of the Highwood River.
2	Total reservoir capacity must be equivalent to or larger than the Super Expanded Women's Coulee site.	Because of unreliable water supplies, the storage site at Stimson Creek would only be able to supply 5,250 dam^3 or 36 per cent of the capacity of Women's Coulee. The Tongue Creek site would be able to supply 90 per cent of the volume of the Women's Coulee site.
3	The cost of developing storage should be equivalent to or less than the Super Expanded Women's Coulee site expressed on a cost/acre foot basis.	In terms of cost per dam^3, the Tongue Creek and Stimson Creek sites would cost 1.6 and 2.0 times more that the estimated $2577 per dam^3 for the Women's Coulee site.
4	Predicted water quality effects on the Highwood River must not be significant adverse effects.	Although definitive water quality studies have not been completed, releases of water from storage at Tongue Creek were predicted to have a more significant impact on water quality than would the Women's Coulee site, while the Stimson Creek site would have the least impact on water quality.
5	The outlet to Highwood River from the storage site is above the Little Bow diversion at the Town of High River.	Reservoirs at any of the three sites would release water back into the Highwood River above the existing diversion.
6	The adverse social and environmental impacts should be less than or equal to those associated with the Super Expanded Women's Coulee Reservoir.	The Tongue Creek site was determined to have greater environmental and social impacts than Women's Coulee in eight of the nine categories of impact assessed. Stimson Creek had greater impacts in five of the nine categories.

Although the analysis showed that Women's Coulee was the best of the storage sites, the department indicated that it could not rule out development at any of the three sites until the HMP had determined how much storage (if any) would be required. Alberta Transportation concluded that, with this assessment, the PAC would be able to determine whether storage

should be included in the HMP, and it sought confirmation that this information satisfied Item 5 of Board Order 9601-1.

The department also suggested that the Comparative Site Assessment satisfied Item 3 of the Board Order, which directed the proponent to complete its economic, social and environmental assessment of the effects of a reservoir at the Women's Coulee site. It submitted that the only shortcoming of the assessment provided to the previous Panel was that it failed to describe the environmental effects of the return canal, and that these effects had been addressed in the comparative assessment of storage sites.

In terms of its next actions, Alberta Transportation stated that it would not conduct any additional fieldwork nor would it submit an application to develop any of the three sites until Alberta Environment has confirmed the need for storage through Phase 1 of the HMP. It believed that conducting any additional fieldwork prior to that decision would appear to confirm the public's suspicion that the government was committed to developing storage even though the PAC was still actively considering this question. Alberta Transportation stated that the PAC should have a better understanding of the need for storage once the supply and demand studies for the HMP have been completed and the PAC has been able to investigate some water management scenarios.

If a storage reservoir was determined to be required, Alberta Transportation indicated that it would then undertake the geotechnical studies needed to complete the technical design of the structures, refine predictions regarding seepage and shoreline stability, and assess options for minimizing social and environmental effects, especially in regard to the optimal location of the return canal. It predicted that nine months would be required to complete this work. The department stated that it would then seek direction from Cabinet as to whether to submit an application to proceed with reservoir development. Following that, Alberta Transportation would begin to develop its application for storage, including an environmental impact assessment, although it expected that this would require very little additional work.

The department noted that, assuming a decision on the need for storage was made by March 2002, and direction from Cabinet to proceed with developing an application was received by the end of 2002, the environmental impact assessment could be completed by the end of 2003, if a summer field season is required. Although it acknowledged that work on the environmental impact assessment could be done during the 2002 summer field season, the department reiterated that it was reluctant to proceed with any additional studies until the community as a whole had confirmed the need for storage and it had received Cabinet direction to proceed.

Alberta Transportation also indicated that an interim diversion plan would have to be developed because, even if storage were required, the new facilities would not be constructed before water would need to be diverted from the Highwood River in the spring of 2003 to fill the new Little Bow River Reservoir. It stated that an interim diversion plan would be filed with Alberta Environment under the *Water Act* in support of its operating licence. Alberta Transportation suggested that this interim plan would be developed in consultation with the PAC by the end of October 2002 and could be in place until such time as the HMP could be implemented. It noted

that the interim diversion plan would be filed with the Joint Review Panel, in accordance with the Board Order, but that it would not be seeking the Panel's approval of the interim plan.

2.4 Town of Nanton

Mr. Blake, the Mayor of Nanton, suggested that Alberta Transportation should proceed with additional investigations of storage at the Women's Coulee site since the Town believed that none of the alternatives to storage would be able to address water demands in the basin. The Town was concerned about whether non-storage options would provide the water quality and quantity needed for the future growth of Nanton and it suggested that the proposed non-storage options would not meet the criteria for sustainable water management set out in the Panel's 1998 Decision Report. Mr. Blake noted that, although one of the original arguments in favour of the Little Bow project was to improve community supplies, no such benefits had resulted for the Town of Nanton and the use of non-storage options might even adversely affect future development of the community. In the opinion of the Town, money intended for studying non-storage options would be better spent developing storage at Women's Coulee. Mr. Blake reported that the Town preferred the Women's Coulee site because of lower costs and its proximity, and because neither of the other two sites would be able to supplement flows in Mosquito Creek.

Mr. Blake reported that the population of the Town had been growing very rapidly in the last few years and had reached about 2000 people, although existing predictions suggested that this would not occur until 2021. He predicted that the town could increase to 5000 people in the next 25 to 30 years. He also noted that, with last summer's drought, many nearby rural households had been getting their domestic water from the Town. He reported that the Town currently has a licensed allocation of about 500 acre-feet per year but had only been using about one-third of this amount. The Town was concerned, however, that implementation of some of the proposed non-storage options might affect its ability to withdraw the full extent of its licensed allocation and thereby adversely affect its ability to supply water to accommodate future population growth. Mr. Blake noted that the Town was currently considering building additional raw water storage facilities as a way of reducing its demands on Mosquito Creek during low flow periods.

Mr. Blake made several other points on behalf of the Town of Nanton. First, the Town would not support having an interim diversion plan because this could become the final plan if no further actions were taken. Second, it noted that the cost of storage at Women's Coulee was only quite high when considered separately from the rest of the Little Bow River project. Mr. Blake argued that the two reservoirs were part of the same overall project and showed that the average cost of storage at both reservoirs (about $1550 per cubic decameter) was not much greater than the equivalent cost for storage for the Little Bow River Reservoir. Third, the Mr. Blake suggested that the PAC give some consideration to using management of the riparian zone adjacent to rivers and creeks as a means of conserving and storing water.

2.5 The M.D. of Foothills

The M.D. of Foothills stated that it is a member of the PAC and it voiced strong support for the PAC process. It recommended that the PAC process be allowed to determine whether storage was actually required before the Panel provided further direction on which of the three sites was best suited for storage. The M.D. believed that, although Alberta Transportation's Comparative

Site Assessment did a fair job of evaluating the three storage sites, the full range of costs had not yet been quantified, opportunities for impact mitigation had not been addressed, and the need for storage had not yet been proven. It also suggested that a decision on the best method for addressing water demands in the basin could not be made until PAC has determined the extent of these demands.

2.6 Wayne Corner/Carol Case and Hugh and Anna MacKenzie

Mr. Wayne Corner, who together with Ms. Carol Case owns land adjacent to the inlet canal for Women's Coulee, presented information on behalf of his family and Hugh and Anna MacKenzie, who also own land beside the canal. As a landowner, Mr. Corner indicated that he was not in favour of having a large open canal with fluctuating water levels located adjacent to his property, but he did support efforts to find the best solution for dealing with water management issues for the Highwood River. He supported PAC's request to extend the deadline for completing Phase 1 of the HMP because he felt that additional time was necessary for the PAC to have sufficient time to review all the options and arrive at the best decision for the basin. He reminded the Panel that the PAC was comprised of volunteers who were being asked to complete a considerable amount of work in addition to their regular responsibilities.

Mr. Corner stressed the importance of demand management and water conservation in addressing water management issues in the Highwood basin and he asked the Panel to include mandatory and voluntary water conservation measures as part of the HMP. He expressed support for educating the public in regard to the value of water and for metering all industrial, agricultural and municipal water users. He also suggested that companies using water for purposes of oilfield injection be required to use saline water.

Having considered the Comparative Site Assessment, Mr. Corner suggested that the analysis was full of errors because of the short 60-day time period given to Alberta Transportation to complete the assessment. He reported that there were some inconsistencies in the criteria used to compare the alternatives, especially in regard to costs. He suggested that potential impacts on groundwater could also be significant and he advocated that a groundwater study for the MD of Foothills should be completed as part of the HMP. Mr. Corner questioned the adequacy of the water quality assessment, noting that no definitive water quality modeling had been done for any of the sites. He suggested that the Panel work with Alberta Transportation and the residents of Women's Coulee to ensure that the necessary assessment of potential impacts on groundwater and soil salinity be completed.

Mr. Corner also expressed concern over the costs and benefits of storage, noting that even the most cost-effective of the three sites – Women's Coulee – was very expensive. He suggested that a more detailed benefit-cost comparison of storage be completed and that these results be compared to the corresponding costs and benefits of non-storage options before a decision on storage can be made.

Mr. Corner also proposed that the revised IFN study should not be considered complete because it did not address water quality, temperature or the winter IFN. He indicated that more work on the IFN was required but was unsure as to how the PAC was expected to use the IFN information. He questioned the need for more water being left in the Highwood to support

instream needs, noting that despite very low water conditions in the Highwood River this year, there had been no reports of fish kills.

Mr. Corner offered four recommendations to the Panel. First, he asked that a full environmental impact assessment be done before committing to a specific option to ensure that there are no unforeseen costs that, with hindsight, would have favoured a different alternative. Second, he supported the proposal that the Panel give the PAC more time to complete its work. Third, he requested that the Panel and NRCB staff carefully review all the technical reports in order to ensure their reliability and accuracy. Fourth, he asked the Panel to carefully review all the options, including water conservation, before deciding on conventional storage.

2.7 Laurent and Brenda St. Louis

Laurent and Brenda St. Louis stated that they are landowners adjacent to the Woman's Coulee site and would be directly and adversely affected by the development of storage at that location. In their submission to the Panel, they concluded that the proposed reservoir could not fully meet the water demands in the basin because of the limited flows in the Highwood River and they suggested that other options for addressing water shortages in the Highwood basin be considered, including changes in irrigation practices and use of storage at the Chain Lakes reservoir.

2.8 Baker Creek/Intake/Woman's Coulee Coalition

Mr. Stephen Evans and Mr. Norman Smith presented the views of the Baker Creek/Intake/ Woman's (sic) Coulee Coalition. The Coalition reported that, in its view, the PAC had been working very effectively over the past few months and it supported the PAC's request for a six-month extension of the deadline for submitting a revised diversion plan. It also commended Alberta Transportation for its cooperation in providing access to the information being used to develop the Comparative Site Assessment.

As part of its presentation, the Coalition provided an alternative view of the issues faced by the Panel. It stated that there has been a long history of water diversions from the Highwood River and a significant amount of the river flow had been diverted during periods of low flow. It also submitted that the Highwood River had been over-allocated, such that diversions for irrigation could exceed the river flow in dry years. The Coalition then noted that policies were revised in the 1980s in order to reserve water for the protection of fisheries, but it believed that this policy only related to rivers that had not already been over-allocated. It concluded that, for over-allocated rivers like the Highwood, conformity with the revised fisheries policy could only be obtained by spending large amounts to develop storage or by incurring large costs by cutting back on irrigation water use.

The Coalition requested that the Panel not make a decision on a preferred storage site until the need for storage in the basin has been confirmed. It was concerned that selection of a preferred storage site at this time would preempt consideration of other possible solutions. However, it also suggested that, if the Panel was to select the best storage site, this decision should be based on accurate information. The Coalition noted that it was not pleased with work done to complete the Comparative Site Assessment, partly because of the limited time available to complete this work. It recommended that the Panel obtain and review additional information before making a decision on a revised diversion plan that included storage. Based on its assessment of non-

storage options, the Coalition expected that the Panel would eventually receive evidence showing that there were effective alternatives to storage, and it asked the Panel to hold a meeting in February 2002 to consider the report on non-storage options.

A detailed critique of the Comparative Site Assessment was provided by the Coalition, particularly in regard to hydrogeology, water quality, visual impacts, economics and water supply. The Coalition indicated that its analysis was limited by a lack of technical expertise, but it believed that Alberta Transportation's assessment was insufficient to determine which of the three sites was best for storing water. It suggested that the hydrogeological assessment provided only a cursory analysis of potential impacts because no new drilling was completed. It was particularly concerned about seepage and associated salinity impacts on the east side of the Women's Coulee site, and the possibility of a buried channel, such as was found at Pine Coulee. The Coalition proposed that additional drilling should be undertaken before any development at the Women's Coulee site could proceed, but concluded that current information on hydrogeology was insufficient to conclude that this was the best of the three sites.

In terms of potential impacts on water quality, the Coalition noted some differences in conclusions about potential levels of dissolved oxygen in the reservoir when it compared the recent analysis with evidence presented at the original Panel hearing, and it sought an explanation for these differences. It noted that the assessment did not consider bank erosion or re-suspension of sediments and it expressed concern about whether a release of clay sediments as a result of slumping might impact fish (clogged gills) and the amount of phosphorous being released. The Coalition also reported that the assessment did not adequately consider how releases of stored water might affect water quality in the Highwood River. In its opinion, demonstrating that released water was consistent with surface water guidelines was not sufficient proof that water quality in the river would not be compromised.

The Coalition disputed the methodology that Alberta Transportation's consultants used to assess the visual impacts. It argued that averaging the ratings for the reservoir and the return intake canals was inappropriate given that the reservoir was so much larger than the canals and would have much greater visibility. Furthermore, it questioned why the analysis precluded the effects on existing adjacent landowners who would have to be bought out if storage development were to proceed.

The Coalition questioned the accuracy of the cost information. It noted that the estimated cost of the Women's Coulee site had more than doubled since 1997 and it believed that the new costs provided by Alberta Transportation were underestimated because it employed lower than normal contingency factors. In its opinion, the Coalition believed that the cost of this site would be closer to $85 million, which would be more than the three already approved components of the Little Bow project, and it noted that this would result in the cost of storage being closer to $5,300 per cubic decameter. It also suggested that the analysis did not fully account for the social costs of having to buy out 14 of 17 adjacent landowners. The Coalition reported that, because of the high cost and with no evidence indicating that there would be a positive return on this investment, there was near unanimous opposition to storage development at Women's Coulee from the 75 adjacent landowners.

In terms of water supply, the Coalition sought more information on whether the Women's Coulee site would be able to supply the demands in one or more dry years and it suggested that average deficit was not a useful criterion for evaluating the alternatives. The Coalition also suggested that Alberta Transportation should have evaluated a two-reservoir option in terms of addressing water demands and potential cost.

2.9 Nelson and Denney Families

In a letter to the Panel, Ralph Nelson indicated that the two families supported the use of non-storage options for addressing water use in the Highwood basin. He suggested that new storage was only an easy short-term solution while there has, as yet, been little time or money spent investigating non-storage options. He also argued that current studies have ignored local wisdom and expertise with respect to the intake canal for Women's Coulee and noted that the issue of canal flooding, which occurred in 1995, had not been considered.

2.10 Anita and Larry Buchan

The Buchans provided a letter to the Panel in which they asked that the decision on storage sites be made by March 2002 so that this issue can be brought to an end and they can get on with their lives.

2.11 Giles Family

The Giles family stated that it remained opposed to the development of storage at Women's Coulee. The family noted that it still had major concerns about how development at this site would affect salinity, high water tables and aquifers in adjacent areas and it believed that its lands would be directly adversely affected by seepage from a reservoir. It also expressed concern that such a project would result in a loss of native fescue grasslands. It queried how additional withdrawals from the Highwood River could actually lead to improvements in the health of the river and adjacent riparian areas, and suggested that the answer lies in better management not storage development. It also questioned whether additional storage would actually solve water supply problems given that the Women's Coulee site would not be able to meet the deficit in all years and would be very costly. The family believed that the HMP should be completed prior to an application for offstream storage being made.

2.12 Fisheries Coalition

Speaking on behalf of the Fisheries Coalition, Mr. Alan Harvie indicated that the PAC had made considerable progress in the last few months and the Coalition supported the PAC's proposal for a six-month extension of the deadline for submitting a revised diversion plan. It observed that there was still considerable work to be done, and attempting to complete this work in the three months prior to March 2002 would necessitate a full-time effort by the unpaid volunteers on the PAC. The Coalition reported that the PAC had just received two key tools - draft reports on the IFN and non-storage options - but it suggested that both these items need more work.

Another concern for the Coalition was the lack of involvement to date by the Department of Fisheries and Oceans (DFO) in the HMP process. It suggested that the Department could provide the PAC with important technical expertise as well as direction with respect to its jurisdiction. The Coalition argued that it was inappropriate for DFO, as a regulatory body, with

decision-making powers, not to be a participant in the PAC process where numerous decisions, in the form of trade-offs between the various water demands, were being considered.

The Coalition requested that, if the deadline for completing the diversion plan was extended, the Panel should reaffirm its recommendation to Albert Environment that the PAC be given sufficient financial resources to continue its work in the next fiscal year.

The Fisheries Coalition proposed that a decision on a storage site be deferred until the need for storage had been proven. In its opinion, a key element in determining the need for storage related to the IFN, and it believed that a scientific peer review of the draft IFN report should be undertaken to confirm the reliability of the evaluation. The Coalition believed that a decision on the need for storage could be made once the IFN had been confirmed and the potential effectiveness of non-storage options had been assessed.

In terms of the Comparative Site Assessment, the Coalition's position was that there was insufficient information to say with certainty that any of the potential storage sites could be removed from further consideration. However, it suspected that the Tongue Creek site could be eliminated because it would have poor water quality, a higher cost and the highest number of affected landowners. It therefore asked the Panel to remove the Tongue Creek site from further consideration and noted that the PAC would then have fewer issues and could have fewer members. It also suggested that the Panel hold its next progress meeting in June 2002, by which time the PAC would have completed its assessment of the IFN and non-storage options and would be assessing water management scenarios.

2.13 MD of Willow Creek

Mr. Ian Sundquist presented the Panel with the views of the MD of Willow Creek. Mr. Sundquist cited various parts of the Panel's 1998 Decision Report to support the MD's views that storage will be required to address water shortages and that the PAC was wasting its time by considering non-storage options. It was particularly concerned that water licence buy-backs were being considered as one of the non-storage options. The MD stated that irrigated agriculture was essential for allowing Albertans to enjoy low food prices and also supported regional economic and population growth. It emphasized that these benefits needed to be factored into the economic assessments of storage options. Since agriculture was the predominant land use in the MD and protection of agricultural activities was of paramount importance, it considered any proposal to buy-back licences or to not respect existing water rights as being a threat to the MD.

The MD submitted that the technical work on the IFN and the sequencing of work being done to prepare the HMP was deviating from what the Panel had outlined in Board Order 9601-1. It suggested that the comparative sites assessment, the IFN and the diversion plan were to be done as part of the assessment of storage at Women's Coulee and that this was then to be included in the HMP. The MD urged Alberta Environment, Alberta Transportation and the PAC to return to this original plan as described in the Board Order.

The MD complimented the PAC on the progress it had made in recent months and supported the PAC's request to extend the deadline to October 31, 2002. It explained that the PAC needed the

time to be able to absorb all of the relevant information it had been given. It also stressed that it was important for all PAC members to understand the information, not just the technical subcommittees. The MD maintained that the six-month extension was justified since the PAC would then have the time to be able to run and evaluate a variety of water management scenarios before deciding on a management plan that would be in place for many years. The MD was cautiously optimistic that the work could actually be completed before the proposed October 31, 2002 deadline.

2.14 Lower Mosquito Creek Water Users Association

Ms. Diana Andrews provided evidence on behalf of the Lower Mosquito Creek Water Users Association (LMCWUA). The Association supported the PAC process, acknowledged the PAC's progress since September, and endorsed the PAC's proposed work plan. However, it noted that progress to date had necessitated major time commitments by PAC members, particularly given the amount of technical information that they have been asked to read and understand. The LMCWUA indicated that the PAC was still at the stage of comprehending existing water supply and demand in the Highwood basin and had yet to start considering future demands. Based on the amount of work still faced by the PAC, the Association supported the request to extend the deadline by six months if the PAC was to successfully develop an HMP. It also indicated that its representative on PAC would not be comfortable making decisions on the HMP without the benefit of this additional time.

The LMCWUA indicated that, in its opinion, non-storage options would not be able to address existing deficits. Based on its review of the draft report on non-storage options, the Association concluded that some of the proposed options, such as those that might prevent agricultural operators from diverting the full amount of their water entitlements, would be unacceptable to its members. Furthermore, it noted that even if all the proposed non-storage options were implemented, they would not address existing deficits let alone the IFN requirements for the Highwood and Little Bow rivers and Mosquito Creek.

In the opinion of the Association, storage will be required and it endorsed the results of the Comparative Site Assessment presented by Alberta Transportation. It submitted that some additional environmental and technical studies at the preferred site would be required once the need for storage has been confirmed, but stated that it believes that the Comparative Site Assessment fulfilled Alberta Transportation's obligations with respect to item 5 of Board Order 9601-1. In terms of selection of the preferred storage site, the Association supported having this decision made as soon as possible because this would speed up the PAC process, would eliminate some PAC members who were not in favour of storage development in their area, and would remove the threat of unwanted development from some communities. The LMCWUA supported the choice of Women's Coulee as the preferred storage site since it would benefit flows in Mosquito Creek.

The Association recommended that development of an interim diversion plan should commence soon. It believed that an interim plan would be required, regardless of whether storage was needed, in order to address existing deficits on the Highwood and Little Bow rivers and Mosquito Creek during periods of low flow. The Association reported that, although Mosquito Creek benefited from stable flows while Clear Lake was being filled last summer, flows in the

Upper Little Bow River suffered as a result. To reduce uncertainty about flows in future years, the LMCWUA wanted an interim diversion plan until a final diversion plan can be developed and implemented.

2.15 Western Feedlots Ltd.

Mr. Brad Walker, the General Manager of Feedlot Operations, indicated that Western Feedlots Ltd. concurred with the results of the Comparative Site Assessment. He noted that Alberta Transportation had undertaken a number of water quality studies since Western Feedlots raised this issue in June 2001. He suggested that the studies confirmed that poor water quality was the fatal flaw for the Tongue Creek site and offered the view that additional studies would not likely change the comparative rankings of the three sites. Mr. Walker proposed that the Panel accept the results of the Comparative Site Assessment and that it identify the preferred site for storage in the basin. While he considered development of any of the storage sites to be unappealing from the perspective of economic and social costs, he supported having the Panel eliminate the Tongue Creek site so that local residents could proceed with their lives.

2.16 Sharon Plett

Ms. Sharon Plett is a member of the PAC representing industry interests and was part of the subcommittee that worked with Alberta Transportation on its Comparative Site Assessment. She commended Alberta Transportation for including potentially affected landowners in the study from start to finish and concluded that their involvement in an open process produced an accurate representation of the potential impacts that could occur at each site. She agreed with Alberta Transportation's conclusion that additional information would probably not lead to a change in the relative rankings of each site and she suggested that the level of analysis addressed the Panel's expectations. She also noted that because of the high cost of storage compared to other recent projects, it was likely that only a single storage reservoir would be viable.

Ms. Plett stated that she supported the conclusions of the Comparative Site Assessment and asked that the Panel make a decision on a preferred site. In her opinion, such a decision would allow Alberta Transportation to commence its detailed assessment of that site and people living in other parts of the basin would no longer have to live with the prospect of water development at their location.

Ms. Plett indicated that she did not support the development of storage and hoped that the PAC would be able to identify sufficient non-storage options to address water deficits. She noted that the need for storage must still be confirmed and a more detailed assessment of the social, economic and environmental effects of the proposed site will be required.

2.17 Morris Walsh

Mr. Walsh, a landowner in the Tongue Creek area, indicated his agreement with Alberta Transportation's Comparative Site Assessment. He congratulated Alberta Transportation on its work and noted that, despite some possible shortcomings in the analysis, he too believed that additional work would not change the relative rankings of the three sites. In his opinion, the assessment concluded that Tongue Creek was not a viable option for water storage and this confirmed what he and others had stated at previous meetings. Mr. Walsh also submitted that the Tongue Creek site would be uneconomic because of the high cost of storage (about $5000 per

acre-foot), the low benefits from irrigating low value crops like barley (about $150 per acre) and the questionable benefits of potential improvements in a catch and release fishery. Based on this evaluation, he noted that if the economics of one storage site were questionable, there could be no economic rationale for development of a second storage site.

Mr. Walsh asked the Panel to decide that the Women's Coulee site was the best site for storage and to eliminate the Tongue Creek site from further study. He noted that all but one of the members of the PAC technical subcommittee endorsed the conclusion that Women's Coulee was the best site. Mr. Walsh believed that a decision by the Panel would provide some certainty for Tongue Creek residents and would allow them to resume their lives. He also submitted that a decision by the Panel would allow the PAC to focus its efforts on completing the HMP while Alberta Transportation could get on with its detailed assessment of the Women's Coulee site.

2.18 Phil Bice

Mr. Bice, a long-time resident of the Tongue Creek area, observed that there had been several proposals to dam Tongue Creek over the last century. However, in his opinion, this site was not suited for water storage because periodic releases of large amounts of water due to rapid snowmelt or heavy rains may lead to contaminants from upstream industrial operations and the regional landfill site polluting the reservoir. He asked that this site be removed from further consideration so that local residents can go on about their business without the threat of future water storage at that site.

2.19 Lower Highwood Water Users' Group

The Panel heard presentations from the Lower Highwood Water Users' Group (LHWUG) as represented by Dr. Gerald Porter and Mr. Bob Berrien. Dr. Porter noted that members of the LHWUG were concerned about the quality and quantity of water in the Lower Highwood River and had concluded that additional storage was essential to resolving these problems in the near future. He suggested that non-storage options and additional storage might be required to address any remaining or future water shortages in the basin. He stated that existing water licences must be respected and submitted that the overall cost of storage must be considered in context of the importance of agriculture to regional development over the long term. Dr. Porter offered his support for the PAC process and for its request to extend the deadline to October 2002.

Mr. Berrien reiterated the position that additional storage was required to resolve water shortages in the basin. He recounted the previous stages of the review process and his recollection was that the original Little Bow project was worthwhile only if additional storage were to be developed at Women's Coulee. Based on the results of the Comparative Site Assessment, Mr. Berrien believed that Alberta Transportation had now proven that there were no other suitable sites for water storage in the basin. He suggested that, although the PAC could continue to develop an HMP assuming that all options were still on the table, it would be preferable for the PAC to accept that storage at Women's Coulee was inevitable. According to Mr. Berrien, this would then allow the PAC to consider how other options might be developed to complement the Women's Coulee site in addressing existing and future water demands. He noted that the Panel's jurisdiction related only to storage and the revised diversion plan, not the HMP, and suggested

that the Panel's decision-making process has been subverted by allowing the decision on storage to be made as part of the HMP.

2.20 Lower Little Bow Water Users Association

Mr. Gary Flitton, an alternate member of the PAC, provided the views of the Lower Little Bow Water Users Association (LLBWUA). The Association was concerned that the question of the IFN must be resolved before the need for storage could be assessed. It remarked that IFN was a relatively new concept (the Highwood IFN was one of the first to be developed in Alberta) and that there was no universally accepted technical basis for determining IFN. The LLBWUA was of the opinion that the IFN being proposed by the working group was inconsistent with the parameters set out in the original 1998 Decision Report. In particular, the Association believed that the impact of water diversion from the Highwood River must be examined in the context of impacts on the entire basin and not just on optimum habitat in the reaches immediately below the diversion. It suggested that the Panel would benefit from understanding how much fish habitat in the entire basin was located in these downstream reaches.

The LLBWUA also suggested that the whole PAC process might be put at risk if it was rushed. It noted that serious errors might have been made in the previous public involvement process for the Highwood IFN because public representatives were rushed and exhausted, and it cautioned against repeating this situation. The LLBWUA also warned that the PAC could become dysfunctional if it was not involved in developing the parameters for major items of discussion, such as the IFN. Without the PAC involvement, the Association was concerned that the technical work would be taken over by provincial bureaucrats whose decisions would not be trusted by the public.

On other matters, the LLBWUA noted that, although non-storage options should be considered, licence holders were unlikely to relinquish their water rights, and the water savings associated with these non-storage options were expected to be small. It also submitted that Cabinet would be unlikely to ever allow the development of storage at the Tongue Creek site because of the high costs and impacts.

2.21 Upper Little Bow Water Users Association

Ms. Shirley Pickering made a presentation on behalf of the Upper Little Bow Water Users Association (ULBWUA). The Association agreed that the PAC had made considerable progress in recent months, especially in the development of a decision-making process that ensured that the differing views of PAC representatives were acknowledged and incorporated into the committee's decisions. It provided an overview of the PAC's decision-making process and showed that decisions could range from unanimity to a two-thirds majority, depending on the number of groups within the PAC that supported the decision. In the case of the Comparative Site Assessment, it noted that only one of the 12 groups present for the discussion objected to the report so the PAC decision was made by consensus.

The ULBWUA also supported the PAC's request for extending the deadline for completing Phase 1 of the HMP. It acknowledged that this delay might continue to create uncertainty for some residents of the basin, but the Association concluded that the additional time was necessary for PAC members to adequately consider how non-storage options could be addressed in the

HMP. The ULBWUA commented that since there were no precedents for incorporating non-storage options in basin management plans (the South Saskatchewan River basin has only just commenced and the resulting guidelines and conservation objections would not be available until 2003), the PAC needed the extra time to adequately consider the economic, social and environmental impacts of both storage and non-storage options.

The Association described additional work that it believed was necessary before the PAC could develop the HMP. It believed that extra field studies were required so that the potential effects of non-storage options on communities could be accurately assessed. Furthermore, the Association believed that the PAC would need additional time to fully examine the draft IFN for the Highwood River, as well as the yet-to-be-completed IFN for the Little Bow River and Mosquito Creek.

The Association voiced its support for the development of an interim diversion plan. In its opinion, the 1994 Operational Plan did not satisfactorily address base flow requirements for Mosquito Creek or for the Little Bow River above the new reservoir. In terms of other work required as part of Board Order 9601-1, the ULBWUA reported that it had not yet seen the details of the water protection plan for the Little Bow River Reservoir and it had not received any additional information on the Frank Lake mitigation plan, but field work related to mitigation of impacts on the Upper Little Bow River would be completed and evaluated soon.

2.22 Colin Dumais

Mr. Dumais spoke on behalf of the Tongue Creek community and stated that, although the community was not opposed to storage, it was convinced that the Tongue Creek was completely inappropriate for development as a reservoir. Having reviewed the Comparative Site Assessment, the community observed that the Tongue Creek site would have the greatest negative environmental, visual, social, transportation and water quality impacts of all three sites. It noted that Tongue Creek residents had cooperated with Alberta Transportation in preparing the comparative assessment and it agreed that, although more studies could have been done on all three sites, the comparative rankings would not likely have changed because the same study methods had been used at all three sites. The community was convinced that with more time and study, the Tongue Creek site would have been ranked even worse. It compared this site to the new Little Bow River Reservoir to demonstrate the higher costs and environmental effects that would result from a smaller Tongue Creek reservoir that, unlike the Little Bow River Reservoir, would create no benefits for local people.

The Tongue Creek community indicated that it was opposed to the PAC's request to extend the deadline for submitting a revised diversion plan because this would prolong making a final decision over storage development at the Tongue Creek site, despite conclusive evidence that this site was unsuitable. To remove this uncertainty, the community requested that the Panel direct Alberta Transportation and Alberta Environment to complete the HMP by March 31, 2002. Alternatively, the community would support extending the deadline to October 31, 2002 as long as the Tongue Creek site was immediately eliminated from further consideration.

2.23 Lisa Murphy

Ms. Murphy reported that she would lose her home and land if storage development at the Women's Coulee site were to proceed. She described the benefits that her family enjoyed from living at the site and indicated that she would prefer not to see the Women's Coulee site developed for additional water storage because of the huge impact that this would have on their lifestyle. She noted that, as long as this site remained under consideration, her family was being held in "limbo", potential improvements to the property were on hold, and they were concerned that they would never be adequately compensated for or even be able to sell their property.

However, if it was determined that the Women's Coulee site was the best site for storage and that storage was needed, Ms. Murphy advocated that negotiations for land purchase should commence immediately. She was concerned that lack of budget or commitment to develop the site could result in continued delays and uncertainty for landowners adjacent to the site. In her opinion, immediate land negotiations would bring the closure necessary for landowners to move ahead and make appropriate decisions regarding relocation.

Ms. Murphy also cautioned that development at Women's Coulee should only proceed for the right reasons. She argued that the PAC should be given sufficient time to make a decision based on complete information and she supported the PAC's request to extend the deadline, even though this would extend the period of uncertainty for some landowners. She also asked the PAC and the Panel to ensure that non-storage options were fully considered as part of the HMP, and questioned whether any of the communities had undertaken conservation initiatives to ensure the future adequacy of its water supply.

2.24 Karen Dumais

Ms. Dumais, a resident of the Tongue Creek area, stated that the results of the Comparative Site Assessment had confirmed her view that reservoir development at the Tongue Creek site was unacceptable. She noted that the Tongue Creek site did not meet many of the criteria set out in the Panel's 1998 Decision Report, particularly in regard to cost, storage capacity and social impacts. She also observed that the Tongue Creek site would have the highest negative wildlife, vegetation, water quality, transportation and visual impacts of any of the three sites, and added that social impacts would only worsen over time because of the higher rate of development in the Tongue Creek area. In terms of water quality, Ms. Dumais questioned whether the high nutrient levels that could occur in a Tongue Creek reservoir would limit the effectiveness of water quality protection plans being developed for other water bodies in the basin.

Ms. Dumais submitted that the Comparative Site Assessment provided a reasonable and consistent evaluation of the three sites and supported Alberta Transportation's rankings of the three sites. Despite some missing information, including estimates of the number of landowners who would be affected by highway relocation, she concluded that the results of the analysis were sufficient to allow determination of a preferred storage site and requested that the Tongue Creek site be removed from further consideration. She asked the Panel not to extend the deadline for submission of a revised diversion plan beyond March 2002, and argued that this would be an unacceptable hardship for Tongue Creek residents. She concluded by asking the Panel to make a decision that would once and for all eliminate the potential for reservoir development at Tongue Creek.

2.25 Orville and Linda Norstrom

The Norstroms provided a written submission to the Panel in which they described the pain and despair of having to live with the uncertainty of possible reservoir development at Tongue Creek. They noted that the social costs of displacing families and the environmental costs of losing valuable farm land would be very high if this reservoir were to be built, and they questioned whether the quality of water being returned to the Highwood River would be suitable for fish because of upstream feedlots. The Norstroms were concerned that the economic costs of the Tongue Creek project were underestimated by a factor of four, and were still unsure of who would actually benefit from this project. They concluded that, based on the information currently before it, the Panel should be able to make a decision on a preferred storage site as quickly as possible. Consequently they requested that the Panel not extend the March 2002 deadline and to make the decision on a preferred storage site so that people in possible storage areas could get on with their lives.

3 Views of the Panel

Based on the presentations at the meeting, it is clear that significant progress has been made on various aspects of the assessment of water management options for the Highwood basin. In particular, there was general consensus that the PAC has been able to move forward effectively. The Panel observed that, as a direct result of very significant effort on the part of its voluntary members, the PAC was well organized and was focused in its efforts to determine whether storage is required to meet water demands in the Highwood basin.

At the meeting, numerous parties also commended Alberta Transportation for the process it used to involve potentially affected landowners in studying and evaluating the potential effects of developing reservoirs at the Stimson Creek, Tongue Creek and Women's Coulee sites. This working relationship represents a notable improvement from the previous situation which, on occasion, was more adversarial, and the Panel commends all parties for their willingness to work together to find solutions.

Although considerable progress has been made, the Panel also heard that many parties still have questions about the timing, sequencing and responsibilities for future work. These included comments on the feasibility of meeting the March 2002 deadline for completing the work associated with Board Order 9601-1 and on the validity of the results of the comparative site assessment. In addition, many parties also spoke about other actions and decisions that would be required before a revised diversion plan could be presented to the Panel. These included questions about the potential effectiveness of non-storage options, the development of the IFN, and the potential need for an interim operating plan so that filling of the new Little Bow River Reservoir could commence in 2003.

The Panel notes that not all of the issues raised at the December 1, 2001 meeting fall immediately within its jurisdiction. The Panel believes that its central role at this time is to provide direction on those issues that relate to the Board Order. In regard to issues beyond its jurisdiction, however, the Panel hopes that its observations, as set out below, may be of assistance to Alberta Environment and the PAC in their efforts to complete Phase 1 of the HMP.

3.1 Progress in Meeting the March 2002 Deadline

In June 2000, the Panel agreed to allow Alberta Transportation to extend the deadline for completion of the conditions of Board Order 9601-1 until March 2002. This extension was granted so that a public advisory committee (the eventual PAC) could, as part of the HMP, consider the full range of options available for addressing existing and future water demands. At the public meeting in June 2001, the Panel became aware of concerns that the March 2002 deadline might not be met, so one of its key objectives for holding another public meeting in December of 2001 was to determine whether this deadline was still realistic.

At the December 1, 2001 meeting, Alberta Environment, the PAC and Alberta Transportation all indicated that it was still possible to attain the March 2002 deadline for completing Phase 1 of the HMP and to develop a revised diversion plan. However, the PAC suggested that two problems would occur if the remaining components of the HMP were to be rushed to completion in the next three months:

- Technical subcommittees, rather than the PAC itself, would be forced to make decisions based on incomplete understanding of all the appropriate technical information involved.
- These decisions could be challenged because not all PAC members would have full knowledge of the information.

The PAC also pointed out that a considerable amount of work would have to be completed before it could develop and evaluate water management scenarios and reach agreement on a revised diversion plan by March 31. The PAC stated that such a schedule would severely stress its volunteer members.

To prevent these problems from occurring, the PAC proposed an alternative work program that would involve extending the deadline for submission of the revised diversion plan until October 31, 2002. Under this plan, the PAC would make the decision on whether storage was needed, including an assessment of non-storage options, by June 2002. However the PAC also noted that, if the extension were granted, an interim diversion plan might have to be developed and approved so that filling of the new Little Bow River Reservoir could commence in the Spring of 2003.

For the most part, there appeared to be support for extending the deadline with only a minority of parties opposed to extending the deadline beyond March 2002. These parties consisted mainly of residents of the Tongue Creek area who requested that the Panel discard Tongue Creek as a potential storage site on the basis of the Comparative Site Analysis. Their concern with an extension was that it would further delay the decision on whether to develop storage at Tongue Creek. They stated that such a delay would have a significant adverse and unwarranted effect on area residents.

As stated at the conclusion of the meeting on December 1, 2001, the Panel accepts the PAC's recommendation of a revised deadline of October 31, 2002 for submission of a revised diversion plan to the NRCB and for fulfilling the outstanding requirements of Board Order 9601-1. In the Panel's opinion, the PAC fully understands the complexity of the tasks before it and has set out a work plan and schedule that it believes will allow it to systematically address these tasks in a way that does not overtax the volunteers who are committed to completing this work. The Panel

supports the PAC's view that a seven-month delay will substantially improve public understanding and support of the resulting water management plan.

The Panel notes that Alberta Transportation indicated that it planned to defer further investigations of alternative storage sites until after the PAC determined that storage was required. The department proposed that nine months would be required to complete the geotechnical studies necessary to confirm the design, and only then would it seek Cabinet direction regarding whether it should apply to construct additional storage in the Highwood basin. If it received this direction, Alberta Transportation would then prepare an application that would include an environmental impact assessment. Based on this sequence of events, an application for new storage in the Highwood basin would not come before the Panel until the Fall of 2003 at the earliest.

The Panel is concerned that further extending the deadline will prolong the uncertainty being experienced by people residing in areas where reservoir development is most likely. This is clearly having a significant negative effect on area residents and the Panel believes that the public interest is best served by ensuring that this period is kept as short as possible. In its proposed work plan, the PAC has indicated that the need for storage can be determined by June 2002 and perhaps even earlier. By monitoring the work of the PAC closely, Alberta Transportation may be able to identify opportunities for undertaking and completing selected geotechnical and environmental studies during 2002 that may allow development of its application earlier than predicted.

Therefore, the Panel strongly recommends that Alberta Transportation not delay significantly in fulfilling the outstanding requirements of Board Order 9601-1. The Panel believes that Alberta Transportation should start as soon as possible on the necessary technical studies and, if the need for storage is confirmed, it should immediately seek clarification from Cabinet as to whether there is a commitment to pursue storage development and then commence the necessary land acquisition.

3.2 Comparative Assessment of Storage Sites

In its June 2001 Decision Report, the Panel directed Alberta Transportation to submit a comparative evaluation of alternative storage sites in the Highwood basin, as described in Condition 5 of Board Order 9601-1. The Panel also indicated that, following an appropriate time for public review of this report and a public meeting to solicit comments, it would then make a decision "concerning the most appropriate site or sites for foreseeable development of storage within the Highwood basin." Alberta Transportation met the Panel's request and submitted its report entitled "Highwood Basin Storage Study – Comparative Site Assessment" to the Panel in September 2001.

The Panel has reviewed this report and the associated submission from Alberta Transportation and has identified three questions that need to be addressed.

- Does the report satisfy Condition 5 of the Board Order?
- What sites are the most appropriate for water storage?
- Does the report also satisfy Condition 3, as suggested by Alberta Transportation?

These questions are addressed below.

3.2.1 Compliance with Condition 5 of Board Order 9601-1

Condition 5 of Board Order 9601-1 specifies:

> The Operator shall update the comparative analysis of potential storage sites within the Highwood River Basin. The comparative analysis shall include among other sites, the Super Expanded Squaw Coulee site, Stimson Creek Site 8 and the Tongue Creek Site 4, and shall include comparative data regarding environmental, social and economic effects for each site identified. The comparative analysis should form part of the completed assessment of the Super Expanded Squaw Coulee Reservoir.

Alberta Transportation submitted that its September 2001 report fulfils the requirements of Condition 5 and further noted that its analysis provided the PAC and Alberta Environment with additional information to assess the role that storage could play in addressing water demands in the Highwood basin. Alberta Transportation also stated that, even if further comparative studies were undertaken, it believed that the relative ranking of the three sites would not change.

Although most parties agreed that Alberta Transportation's comparative assessment was not entirely complete, the majority also agreed that additional studies would not have resulted in a different relative ranking of the three sites. A number of parties also stated that they believed that the Comparative Site Assessment fulfilled Condition 5 of the Board Order. However, some parties argued that the assessment remained incomplete, mainly because of the limited time that Alberta Transportation had been given to complete the analysis. These parties suggested that additional assessment of potential impacts on water quality, groundwater, soil salinity and visual resources was required. Some also suggested that inconsistent criteria were used to assess project costs and they submitted that a more complete assessment of these costs was required before the PAC could effectively compare the cost-effectiveness of storage and non-storage options.

Having reviewed the Comparative Site Assessment and the evidence provided by all the parties, the Panel has determined that the report does meet Condition 5 of the Board Order. The report clearly provides "comparative data regarding the environmental, social and economic effects" for each of the three sites. Furthermore, the analysis is sufficiently detailed to allow Alberta Transportation to confirm that Women's Coulee is in all likelihood the best of the three potential storage sites. While more studies could have provided additional information, the Panel believes that the overall content of the report is sufficient to fulfill its intended purpose.

The Panel notes that numerous parties commented that Alberta Transportation had provided ample opportunity for representatives from each of the three sites to be involved in the assessment process. The Panel accepts that there has been adequate public input for the purpose of the report, and considers it unlikely that any significant factors were omitted from the assessment.

3.2.2 Most appropriate sites for water storage

According to Alberta Transportation, the results of its Comparative Site Assessment indicated "the Women's Coulee site provides the best opportunity for the development of storage within the Highwood River basin having regard for cost and social and environmental impacts." In

reaching this conclusion, Alberta Transportation employed the evaluation criteria set out in the Joint Review Panel's 1998 Decision Report as summarized on page 6 of this report. According to Alberta Transportation's assessment, both the Tongue Creek and Stimson Creek sites were smaller in size, would be more expensive to build, and would have greater adverse environmental and/or social impacts.

Various parties argued that a decision on the storage site should only be made after the PAC has determined how much water will be needed to address existing and future demands and the extent to which non-storage options can address these shortfalls. However, some parties proposed that a decision on storage be made as quickly possible because non-storage options would be very unlikely to address all of the needs in the basin and/or because further delays in making this decision would represent an unacceptable hardship for landowners adjacent to the other sites.

The Panel recognizes the difficulty facing Alberta Transportation and Alberta Environment in selecting a preferred site before the need for storage has been conclusively proven. At the same time, the Panel believes that it would be in the public interest to provide some direction to both government and the public with regard to its views on the most likely scenario. Therefore, based on the information before it, the Panel accepts that the Women's Coulee site represents the most appropriate site for foreseeable storage within the Highwood basin. It has received no information showing that there is a better site elsewhere in the basin. This should not be construed to mean that the Panel has concluded that storage is necessary. The Panel will wait for the results of the HMP before reaching any conclusions on this issue.

Based on the results of the comparative analysis, the Panel does believe that, for the foreseeable future, it is highly unlikely that the Alberta Government would propose to develop water storage at either the Tongue Creek or Stimson Creek sites. While the Panel cannot state with absolute certainty that water development could never be required at another site in addition to the Women's Coulee site, both the Tongue Creek and Stimson Creek sites clearly appear to be significantly less suitable for providing water storage.

3.2.3 Compliance with Condition 3 of Board Order 9601-1

Condition 3 of Board Order 9601-1 specifies:

> The Operator shall complete its economic, social, and environmental assessment of the effects of the Super Expanded Squaw Coulee project component within twelve months of the date of issuance of this Order.

Alberta Transportation submitted that the only shortcoming of the original report related to the return canal and, since this was addressed in the Comparative Site Assessment, no further work was required to satisfy Condition 3.

However, Alberta Transportation also suggested that if Alberta Environment, in consultation with the PAC, concludes that storage is required, some additional study of the Women's Coulee site would be required before an application for storage could be submitted. It indicated that additional geotechnical work would need to be undertaken to complete the project design,

including the best location of canals and mitigation opportunities. It indicated that this work would take an additional nine months.

The department stated that it expected that a full environmental impact assessment would also be required as part of an application to develop additional storage at Women's Coulee. Assuming that a summer field season was required to complete the assessment, Alberta Transportation expected that this assessment would not be completed before the end of 2003. It indicated that it would be reluctant to commence environmental fieldwork in 2002 because access to lands would be difficult until there had been confirmation that storage would be needed.

The Panel notes that some parties also commented on the need for additional work on groundwater and seepage issues before finalizing an application for development at the Women's Coulee site. However, none of them commented on the need for additional environmental studies by Alberta Transportation as part of developing its application for a revised diversion plan.

At the time Board Order 9601-1 was issued, the original Panel had concluded that existing water management practices in the Highwood basin were unsustainable, that storage was the preferred option for resolving this problem, and that Women's Coulee appeared to be the best site for storage development. The conditions in the Board Order were specifically developed so that an application from Alberta Transportation would come forward for a revised diversion plan that would include sufficient information about the environmental, social and economic impacts of the plan including storage. The Panel believed that this information was needed if it was to make a knowledgeable determination as to whether the application was in the public interest. Condition 3 of the Board Order specifically directed the department to complete its assessment of the impacts of developing additional storage at Women's Coulee.

In this context, the Panel does not agree with Alberta Transportation's assertion that its work to date satisfies Condition 3. Should storage prove to be required, the Panel still expects Alberta Transportation to prepare and submit a comprehensive assessment of the environmental, social and economic impacts of any such project as part of its eventual application to expand storage at Women's Coulee. As suggested by Alberta Transportation, the additional work completed as part of the comparative assessment will assist this task, but the Panel will still very likely require additional information in order to determine whether the project represents an appropriate balance between benefits and costs. However, the Panel also believes that Alberta Transportation should not be required to provide this information until it has received Cabinet approval to submit an application for storage development at Women's Coulee.

What is not clear is whether such additional information supporting Alberta Transportation's application for storage would trigger a complete environmental assessment report, conducted under the terms of the *Environmental Protection and Enhancement Act*. To resolve this process question, the Panel will seek clarification from Alberta Environment regarding the nature of the environmental assessment process that would have to be followed if an application for storage were to be submitted. The Panel will also ask that Alberta Environment forward this information on to the PAC and other interested members of the public.

3.3 Interim Operating Plan

Alberta Transportation reported that, because of the requirement starting in the Spring of 2003 for additional water to be diverted from the Highwood River to begin filling the new Little Bow River Reservoir, it planned to develop an interim diversion plan for the Highwood River. The department indicated that the interim plan would be developed at the same time as the revised plan, with a target date of October 31, 2002, and would be filed with Alberta Environment as a requirement of its water licence.

Both the Upper Little Bow Water Users Association and the Lower Mosquito Creek Water Users Association supported the development of an interim operating plan. In their view, the 1994 diversion plan currently being employed does not provide enough water to address the instream requirements of the upper Little Bow River or Mosquito Creek. Some other parties had reservations about adopting an interim plan because it could become the final plan, if for some reason there was no commitment to develop any of the structural elements upon which the revised diversion plan was predicated.

The Panel accepts that an interim operating plan will be required by Alberta Transportation until the revised plan is developed. The Panel expects that Alberta Transportation will develop the interim plan in consultation with the PAC so that all of the various interest groups have prior knowledge of any changes in existing water diversions. Alberta Transportation indicated that both the interim and revised diversion plans would be developed at the same time, and the Panel expects to receive both plans by October 31, 2002.

3.4 Assessment of Non-Storage Options

A number of parties voiced misgiving about the need for and the adequacy of the draft report on non-storage options. Although a few parties suggested that further study of such options was unwarranted because non-storage options would be inadequate to address the water deficits in the basin, others cautioned the Panel not to make a decision on storage until the potential for non-storage options has been fully assessed by the PAC. Various parties asked the Panel to direct that the HMP include non-storage options.

The Panel is not able to comment on non-storage options at this time. A report on non-storage options has not been presented to the Panel and, at the time of the December 2001 meeting, the report was only in draft form with the PAC noting that additional work had yet to be completed. More importantly, however, the assessment of non-storage options is being developed as part of the HMP, so the PAC and Alberta Environment, not the Panel, are responsible for agreeing on the eventual form, content and conclusions of this report and how it will be incorporated into the development of that plan.

3.5 Assessment of Instream Flow Needs

Various parties commented on the draft IFN report that had recently been submitted to the PAC. Some parties were concerned that the methodology used to develop this report was inconsistent with the original Panel's 1998 Decision Report. Some argued that the IFN work had not addressed water quality, temperature or winter flows; others suggested that the IFN only considered fish habitat conditions for downstream reaches and not in the context of the entire

Highwood basin. The Panel was asked to provide direction regarding how the IFN should be finalized.

Again, the Panel is not able to provide direction on the IFN because this report is only in draft form and has not been submitted to the Panel. The Panel recognizes the importance of having a technically valid IFN before the PAC can develop and evaluate water management scenarios that consider trade-offs between instream needs and other water demands. The Panel expects that the IFN for the Highwood River, Little Bow River and Mosquito Creek will receive a full review when Alberta Transportation submits its application for a revised diversion plan.

The Panel notes the concerns raised by the Fisheries Coalition with respect to the role taken to date by DFO in the public consultation and planning process. The Fisheries Coalition noted that, although DFO has regulatory responsibility for fish habitat, it had not yet been active in the PAC process.

The Panel strongly supports the extension by PAC of an invitation to DFO to participate in its planning process in whatever capacity that PAC believes appropriate. Since the December 2001 meeting the Panel has been informed that DFO has been invited to and will attend future PAC meetings dealing with the IFN. The Panel supports the Department's timely involvement in the PAC progress. At the next public meeting, the Panel will expect a report from DFO regarding its views on the status of the planning process and issues that it believes remain to be addressed. Such a report should be of significant value to the Panel in fulfilling its Federal mandate of providing advice to the Federal Minister of Environment.

4. Next Steps

The Panel supports the PAC process as it is being conducted at this time, and NRCB staff will continue to be available to provide technical assistance to the PAC, as requested. The Panel will monitor the progress of the work being carried out on the HMP and would consider convening another public meeting if requested by interested parties. A number of parties suggested that a meeting with the Panel might be appropriate once the PAC has accepted the reports on non-storage options and the IFN and before it begins to develop and assess water management scenarios. The Panel is amenable to holding another public meeting at that time if it would be helpful to the process, but it will rely on the PAC to determine when this should occur. Once a revised diversion plan has been submitted, the Panel will determine the appropriate time for commencing the formal hearing process.

DATED at Edmonton, Alberta on 19 February 2002.

Joint Natural Resources Conservation Board/Canadian Environmental Assessment Review Panel

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APPENDIX A

BOARD ORDER 9601-1

THE PROVINCE OF ALBERTA
NATURAL RESOURCES CONSERVATION BOARD ACT
NATURAL RESOURCES CONSERVATION BOARD

IN THE MATTER of a project of
Alberta Public Works, Supply and
Services for approval to construct
a water management project (the Project)
to convey and store water
diverted from the Highwood River

BOARD ORDER NO. 9601-1

WHEREAS the construction of water management facilities proposed to convey and store water diverted from the Highwood River by Her Majesty the Queen in Right of Alberta as represented by Alberta Public Works, Supply and Services (APWSS), consisting of four interrelated components:

1. A canal and diversion works in the Town of High River and in the Municipal District of Foothills No. 31. This proposed $6.2 million component would triple the capacity of the existing diversion works and canal to allow more water to be diverted from the Highwood River to the Little Bow River during peak flows.

2. Construction of the Little Bow River dam and reservoir in the Municipal District of Willow Creek No. 26 and in the County of Vulcan No. 2, approximately 20 kilometres (km) west of Champion. The proposed $38.8 million dam would be 25 metres high and create a reservoir that would hold 50,000 acre-feet of water. It would be filled from the natural runoff in the Little Bow River basin and water diverted from the Highwood River.

3. Construction of the proposed $5.1 million Clear Lake diversion and canal in the Municipal District of Willow Creek, about 15 km east of the Town of Stavely. The 10 km long canal would allow the lake and 12 wetlands along the route to be filled when flows in Mosquito Creek are high; and

4. The proposed $7.1 million enlargement of the existing Squaw Coulee Reservoir in the Municipal District of Foothills No. 31 from 293 acre-feet to 5,175 acre-feet by constructing upper and lower dams and a return canal to the Highwood River,

is a reviewable project under s.4(d) of the *Natural Resources Conservation Board Act* being chapter N-5.5 of the Statutes of Alberta, 1990; and

WHEREAS the Natural Resources Conservation Board may defer consideration of an application on any terms and conditions that the Board may prescribe or make any other disposition of an application that the Board considers to be appropriate.

WHEREAS the Natural Resources Conservation Board has deferred a decision respecting the Expanded Squaw Coulee component of the application by Alberta Public Works, Supply and Services for the construction and operation of certain water management facilities on the Highwood River and in Squaw Coulee including the Diversion Plans pertaining to proposed diversion works leading to Squaw Coulee and from Squaw Coulee to the Highwood River and to Mosquito Creek; and the Diversion Plans pertaining to the operation during the low flow season of late July and August of certain expanded diversion works in the Town of High River leading to the Little Bow River, subject to the filing and review of certain supplemental information herein specified.

THEREFORE, the Natural Resources Conservation Board hereby orders as follows:

1. The consideration of the operating plan for the expanded works for the diversion of water at High River from the Highwood River to the Little Bow River during the low flow season is deferred pending receipt and review of additional information as described herein.

2. The consideration of the expansion of the Squaw Coulee Reservoir and associated diversion works and return works is deferred.

3. The Operator shall complete its economic, social, and environmental assessment of the effects of the Super Expanded Squaw Coulee project component within twelve months of the date of issuance of this Order.

4. The Operator shall file with the Board for its approval the plans for the completion of the assessment of the economic, social and environmental effects of the Super Expanded Squaw Coulee project component, including a specific plan for public involvement, within three months of the date of issuance of this Order.

5. The Operator shall update the comparative analysis of potential storage sites within the Highwood River Basin. The comparative analysis shall include among other sites, the Super Expanded Squaw Coulee site, Stimson Creek Site 8 and the Tongue Creek Site 4, and shall include comparative data regarding environmental, social and economic effects for each site identified. The comparative analysis should form part of the completed assessment of the Super Expanded Squaw Coulee Reservoir.

6. The Operator shall, to the satisfaction of Alberta Environmental Protection, revise the IFN analysis used in the Application to reflect current fisheries management objectives for the Highwood River and to include instream flow needs based on the most recent information regarding the River, and current scientific assessment procedures and file the results thereof in the updated assessment of the economic, social and environmental effects of the Super Expanded Squaw Coulee project component.

7. The Operator shall file with the completed assessment of the economic, social and environmental effects of the Super Expanded Squaw Coulee project component an updated plan for the completion of the Highwood River Basin Water Management Plan based on the advice and consent of Alberta Environmental Protection. This update shall include: the design of an independent mediated/facilitated process; the process to identify all stakeholders and their respective community representation; detailed timelines

providing for the completion of the HMP planning process within a period of two years; and cost estimates for consulting services and studies related to both parts (design and implementation) of the HMP.

8. The Panel requires that the completed assessment of the Super Expanded Squaw Coulee Reservoir project component include a revised Diversion Plan for works leading to and from Squaw Coulee and for diversion works downstream at High River leading to the Little Bow River.

Made at the City of Edmonton, in the Province of Alberta, this day of , 1998.

NATURAL RESOURCES CONSERVATION BOARD